SIERRA WIRELESS
HEART OF THE WIRELESS MACHINE™

Sierra Wireless
DART 300 CDPD Modem

Migration Guide

For Users of the DART 200

2110291 Rev 1.0
November 2000

Important Notice

Because of the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless, Inc., accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

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WARNING (EMI) - United States FCC Information

This equipment has been tested and found to comply with the Class B limits pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in an appropriate installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna*
- *Increase the separation between the equipment and receiver*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected*
- *Consult the dealer or an experienced radio/TV technician for help*

WARNING – FCC RF Exposure Guidelines

While this device is in operation, a separation distance of at least 20cm must be maintained between the radiating antenna and the body of all persons exposed by the transmitter to meet FCC exposure guidelines.

This transmitter is only approved to operate with an antenna not exceeding 1.5 watts total system ERP (effective radiated power) for operations with the antenna located at more than 20 cm from all persons. The warning label must be displayed at the base of the antenna (if stand-alone) or attached to the final product (if the antenna is integral with the product), clearly visible to all persons exposed to the transmitter.

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This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference causing equipment standard entitled 'Digital Apparatus', ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur: 'Appareils Numériques', NMB-003 édictée par le ministre des Communications.

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Your comments and suggestions on improving this documentation are welcome and appreciated. Please email your feedback to documentation@sierrawireless.com. Thank you.

Consult our website for
up-to-date product descriptions, documentation,
application notes, firmware upgrades,
troubleshooting tips, and press releases:

www.sierrawireless.com

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1. About this Guide

1.1. Introduction

This Migration Guide is designed to assist application software developers who have experience with the DART 200 in porting applications for use with the new DART 300 CDPD modem.

Installations will require changes to the DART configuration commands used on the DART 200 in order to use the DART 300 in its place. There should not be a need to alter either local or remote system applications related to end-to-end communication. Only the DART modem's initial one-time configuration needs to be converted.

1.1.1. Document Structure

This guide is organized into the following sections:

- Section 1, *About this Guide*, introduces the references and conventions used.
- Section 2, *Sample Configurations*, provides DART 300 equivalents of the samples that were included in the original DART 200 User Manual.
- Section 3, *Difference Summary*, highlights the differences between the two models in areas such as: interfaces, operation, and control considerations, as well as specifications.
- Section 4, *Comparative AT Command Reference*, cross-references the commands and registers of the DART 200 and the DART 300.

The final section, providing the command and register comparison, first presents the list of DART 200 commands and registers and their equivalents in the DART 300. This list should allow you to translate any existing DART 200 configuration into an equivalent DART 300 set-up.

There is then an additional list of commands, unique to the DART 300, with an explanation of how the DART 200 would achieve the same function. This is provided to help users familiar with the DART 200 to better understand the commands available in the DART 300.

1.2. References

For background information on the nature of wireless communications consult your cellular service provider and/or their Internet site. All major service providers provide web-based information on CDPD.

The Sierra Wireless web site at www.sierrawireless.com includes a document library in the Support and Downloads section. This library includes other useful documents such as:

- DART 300 User's Guide, 2110212
- Glossary of Terms and Acronyms, 2110032
- CDPD Primer, 2130006
- Problem Report Sheet, 2110125

1.3. Currency

This document may be revised from time to time as new firmware and features are made available. Please check our website for revisions. This edition is:

Rev 1.0 November 8, 2000

DART 300 / SB300

This document is current with the modem firmware revision **R1.3.5**. To determine your firmware revision:

1. Enter the Identification command **ATI5**
   The modem will respond with the Firmware revision information:
   R1_3_5 …

The details following the revision number include Sierra information on the specific build followed by the date and time of the build.

1.4. Conventions Used in this Reference

Result Code – This is a numeric or text code that is returned after all AT commands (except resets).

Response – This term indicates a response from the modem that is issued prior to a result code. Reading registers or issuing commands that report information will provide a response followed by a result code unless the command generates an error.

Numbers are assumed decimal. Hexadecimal values are shown with a prefix of 0x, i.e. in the form 0x3F. Binary values are shown with a prefix of 0b, i.e. in the form 0b01101011.

Character codes that are described with words or standard abbreviations are shown within angle brackets: such as <CR> for Carriage Return and <SP> for a blank space character.

AT Command and register syntax is noted using an alternate font:

AT+WS46=4

Responses and result codes from the modem are shown in an alternate font:

NO CARRIER

WARNING

Notes in this form denote a physical hazard. The warning calls attention to a procedure or practice, which if not performed correctly could result in personal injury.

CAUTION

Notes in this form highlight a procedure or practice which, if not performed correctly, could result in loss of data or damage to equipment. This is also used to highlight issues related to regulatory limitations.

NOTE

This form of note draws attention to procedures or practices which, if not performed correctly, could result in failure of a process or improper configuration. These are typically pre-requisites to other operations.

2. Sample Configurations

The DART 200 User's Guide contained several sample configurations. This section provides the equivalent configurations for the DART 300 modem to illustrate the scope of configuration differences. The commands for both the DART 200 and DART 300 are shown side by side for comparison.

Details of the differences in behaviour between the two modems are summarized in subsequent sections. The comparative AT Command Reference at the end of this guide provides additional details to aid in translating an existing DART 200 configuration into an equivalent DART 300 set-up.

2.1. Sample UDP Setups

Below are the Remote (telemetry server) UDP Setup and the matching Host (monitoring client) UDP Setup from Section 5 of the DART 200 manual.

Table 2-1 Remote UDP Setup (Server)

DART 200 Command	DART 300 Equivalent	Description
^A<ip>	**+WPNEI=<ip>**	Set the IP address (NEI) of the modem.
\N<s_2>	**+WS174=<s_3>**	Set the side preference. The direct translation of the side preference numbers is: **s_2** **s_3** 1 3 A Only 2 4 B Only 3 1 A Preferred 4 2 B Preferred
\J0 (default)	**+WPSPNI=**<enter>	No channel restrictions, no SPNI matching.
\R4	**+WS173=1**	Use auto-registration mode.
S13=0	N/A	Continuous automatic registration. The DART 300 always uses continuous mode.
\O0	**+WS45=0**	Set (UDP) PAD mode.
***A2**	Handled by previous command.	UDP Server mode.
***L2100** (default)	**+WS212=2100** (default)	Listen on port 2100.
S0=1	**S0=1** (default)	Auto-answer mode.
S82=0	**+WS217=0** (default)	Turn off UDP server receive lock. The DART 200 command also disables use of friends. The DART 300 disables friends if the list is empty (the default condition). Consult Section 3.2.4.1 below for a discussion of the receive lock.
E0	**E0**	Command state echo off.
V0	**V0**	Use numeric result codes.
Q0 (default)	**Q0** (default)	Disable Quiet mode.

Table 2-1 Remote UDP Setup (Server) (continued)

DART 200 Command	DART 300 Equivalent	Description
F1 (default)	**+WS62=0**	Data state echo off.
X1 (default)	N/A	Extended result codes. The DART 300 will accept the **X1** command but takes no action.
&C1 (default)	N/A	DCD follows state of connection. The DART 300 uses this configuration and does not allow changes to DCD function.
&D0 (default)	**&D0**	Ignore DTR for data state escape.
&E2	**S2=43** (Sets TDES escape character to "+") (default)	Enable the escape sequence and filter it from the packet. The DART 300 ensures TDES is enabled; the DART 300 always filters it from the packet.
&S0 (default)	N/A	DSR always active. The DART 300 always asserts DSR.
\F3 (default)	Not needed, the next command would change the setting.	Includes PAD forwarding character in packet.
\M0 (default)	**+WS63=0**	Disables PAD forwarding character.
\Q0	***Not supported.*** The DART 300 supports only hardware flow control.	No flow control. (See Section 3.1.1 below if hardware flow control is not provided by your local host device.)
\T1 (default)	**+WS70=20**	Timed data forwarding (always used with binary data). The DART 200 configuration assumes use of the default value in S50 (20 tenths of a second).
***B0** (default)	N/A	Disable broadcast reception.
***C1** (default)	N/A	Enable SLIP TCP header compression.
***G1** (default)	N/A	Multicast address selection.
***K0** (default)	**S30=0** (default)	Session timeout not used in UDP on DART 200. The DART 300 does support session timeout on UDP sessions and will require it if receive locking is not used and the local device cannot close the session. Consult the DART 300 User Guide for details on using it.
***R0** (default)	N/A	Auto-SLIP disabled.
***T0** (default)	N/A	No Telnet keep-alives.

Table 2-2 Host UDP Setup (client)

DART 200 Command	DART 300 Equivalent	Description
^A<ip>	**+WPNEI=<ip>**	Set the IP address (NEI) of the modem.
\N<s_2>	**+WS174=<s_3>**	Set the side preference. The direct translation of the side preference numbers is: **s_2** **s_3** 1 3 A Only 2 4 B Only 3 1 A Preferred 4 2 B Preferred
\J0 (default)	**+WPSPNI=**<enter>	No channel restrictions, no SPNI matching.
\R4	**+WS173=1**	Use auto-registration mode.
S13=0	N/A	Continuous automatic registration. The DART 300 always uses continuous mode.
\O0	**+WS45=0**	Set (UDP) PAD mode.
***A0** (default)	**S0=0** (manual answer) **+WS212=0** (disable server)	No server required.
***L2100** (default)	**+WS212=2100** (default)	Listen on port 2100.
S82=0	**+WS217=0** (default)	Turn off UDP server receive lock. The DART 200 command also disables use of friends. The DART 300 disables friends if the list is empty (the default condition).
E0	**E0**	Command state echo off.
V0	**V0**	Use numeric result codes.
Q0 (default)	**Q0** (default)	Disable Quiet mode.
F1 (default)	**+WS62=0**	Data state echo off.
X1 (default)	N/A	Extended result codes. The DART 300 will accept the **X1** command but takes no action.
&C1 (default)	N/A	DCD follows state of connection. The DART 300 uses this configuration and does not allow changes to DCD function.
&D0 (default)	**&D0**	Ignore DTR.
&E2	**S2=43** (Sets TDES escape character to "+") (default)	Enable the escape sequence and filter it from the packet. The DART 300 ensures TDES is enabled; the DART 300 always filters it from the packet.
&S0 (default)	N/A	DSR always active. The DART 300 always asserts DSR.
\F3 (default)	Not needed, the next command would change the setting.	Includes PAD forwarding character in packet.
\M0 (default)	**+WS63=0**	Disables PAD forwarding character.

Table 2-2 Host UDP Setup (client) (continued)

DART 200 Command	DART 300 Equivalent	Description
\Q2 (default)	N/A	Use hardware flow control (RTS/CTS). The DART 300 supports only this flow control.
\T1 (default)	**+WS70=20**	Timed data forwarding (always used with binary data). The DART 200 configuration assumes use of the default value in S50 (20 tenths of a second).
***B0** (default)	N/A	Disable broadcast reception.
***C1** (default)	N/A	Enable SLIP TCP header compression.
***G1** (default)	N/A	Multicast address selection.
***K0** (default)	**S30=0** (default)	Session timeout not used in UDP on DART 200. The DART 300 does support session timeout on UDP sessions. Consult the DART 300 User Guide for details on using it.
***R0** (default)	N/A	Auto-SLIP disabled.
***T0** (default)	N/A	No Telnet keep-alives.

2.2. Sample TCP Setups

Below are the Remote (telemetry server) TCP Setup and the matching Host (monitoring client) TCP Setup from Section 5 of the DART 200 manual.

Table 2-3 Remote TCP Setup (Server)

DART 200 Command	DART 300 Equivalent	Description
^A<ip>	**+WPNEI=<ip>**	Set the IP address (NEI) of the modem.
\N<s_2>	**+WS174=<s_3>**	Set the side preference. The direct translation of the side preference numbers is: s_2 s_3 1 3 A Only 2 4 B Only 3 1 A Preferred 4 2 B Preferred
\J0	**+WPSPNI=**<enter>	No channel restrictions, no SPNI matching.
\R4	**+WS173=1**	Use auto-registration mode.
S13=0	N/A	Continuous automatic registration. The DART 300 always uses continuous mode.
\O0	**+WS45=1**	Set (TCP) PAD mode.
***A1**	Handled by previous command.	TCP Server mode.
S0=1	**S0=1** (default)	Auto-answer mode.
***L2100** (default)	**+WS212=2100** (default)	Listen on port 2100.
E0	**E0**	Command state echo off.

Table 2-3 Remote TCP Setup (Server) (continued)

DART 200 Command	DART 300 Equivalent	Description
V0	**V0**	Use numeric result codes.
Q0 (default)	**Q0** (default)	Disable Quiet mode.
F1 (default)	**+WS62=0**	Data state echo off.
X1 (default)	N/A	Extended result codes. The DART 300 will accept the **X1** command but takes no action.
&C1 (default)	N/A	DCD follows state of connection. The DART 300 uses this configuration and does not allow changes to DCD function.
&D0 (default)	**&D0**	Ignore DTR for data state escape.
&E2	**S2=43** (Sets TDES escape character to "+") (default)	Enable the escape sequence and filter it from the packet. The DART 300 ensures TDES is enabled; the DART 300 always filters it from the packet.
&S0 (default)	N/A	DSR always active. The DART 300 always asserts DSR.
\F3 (default)	Not needed, the next command would change the setting.	Includes PAD forwarding character in packet.
\M0 (default)	**+WS63=0**	Disables PAD forwarding character.
\Q0	***Not supported.*** The DART 300 supports only hardware flow control.	No flow control. (See Section 3.1.1 below if hardware flow control is not provided by your local host device.)
\T1 (default)	**+WS70=20**	Timed data forwarding (always used with binary data). The DART 200 configuration assumes use of the default value in S50 (20 tenths of a second).
***B0** (default)	N/A	Disable broadcast reception.
***C1** (default)	N/A	Enable SLIP TCP header compression.
***G1** (default)	N/A	Multicast address selection.
***K2**	***Not supported.*** The DART 300 supports only an idle session timeout (**S30**).	Receive keep-alive; unidirectional.
S86=3	***Not supported.*** The DART 300 supports only a bi-directional idle session timeout (**S30=3**).	Keep-alive timer set to 3 minutes. With the DART 200 setting of ***K2** above, the DART 300 setting of **S30=3** is an equivalent with the exception that any dummy keep-alive packets will *not* be discarded by the DART 300. See Section 3.2.3.1 below for details.
***R0** (default)	N/A	Auto-SLIP disabled.
***T0** (default)	N/A	No Telnet keep-alives.

Following is the client side configuration for a TCP installation.

Table 2-4 Host TCP Setup (client)

DART 200 Command	DART 300 Equivalent	Description
^A<ip>	**+WPNEI=<ip>**	Set the IP address (NEI) of the modem.
\N<s_2>	**+WS174=<s_3>**	Set the side preference. The direct translation of the side preference numbers is: s_2 s_3 1 3 A Only 2 4 B Only 3 1 A Preferred 4 2 B Preferred
\J0 (default)	**+WPSPNI=**<enter>	No channel restrictions, no SPNI matching.
\R4	**+WS173=1**	Use auto-registration mode.
S13=0	N/A	Continuous automatic registration. The DART 300 always uses continuous mode.
\O0	**+WS45=1**	Set (TCP) PAD mode.
***A0** (default)	**S0=0** (manual answer) **+WS212=0** (disable server)	No server required.
***L2100** (default)	**+WS212=2100** (default)	Listen on port 2100.
E0	**E0**	Command state echo off.
V0	**V0**	Use numeric result codes.
Q0 (default)	**Q0** (default)	Disable Quiet mode.
F1 (default)	**+WS62=0**	Data state echo off.
X1 (default)	N/A	Extended result codes. The DART 300 will accept the **X1** command but takes no action.
&C1 (default)	N/A	DCD follows state of connection. The DART 300 uses this configuration and does not allow changes to DCD function.
&D0 (default)	**&D0**	Ignore DTR.
&E2	**S2=43** (Sets TDES escape character to "+") (default)	Enable the escape sequence and filter it from the packet. The DART 300 ensures TDES is enabled; the DART 300 always filters it from the packet.
&S0 (default)	N/A	DSR always active. The DART 300 always asserts DSR.
\F3 (default)	Not needed, the next command would change the setting.	Includes PAD forwarding character in packet.
\M0 (default)	**+WS63=0**	Disables PAD forwarding character.

Table 2-4 Host TCP Setup (client) (continued)

DART 200 Command	DART 300 Equivalent	Description
\Q2 (default)	N/A	Use hardware flow control (RTS/CTS). The DART 300 supports only this flow control.
\T1 (default)	**+WS70=20**	Timed data forwarding (always used with binary data). The DART 200 configuration assumes use of the default value in S50 (20 tenths of a second).
***B0** (default)	N/A	Disable broadcast reception.
***C1** (default)	N/A	Enable SLIP TCP header compression.
***G1** (default)	N/A	Multicast address selection.

3. Difference Summary

This section summarizes the differences between the DART 200 and DART 300 in several main categories:

- Interfaces
- Operation
- Additional Control Considerations
- Specifications

3.1. Interfaces

3.1.1. Serial Interface Specifications

The DART 300 supports a broader range of data rates (up to 57600 bps) but does not support autobaud rate detection as the DART 200 did. The DART 300 also restricts the port characteristics to 8 data bits and no parity.

The DART 300 requires the use of DTR and hardware flow control to communicate in data state. This will require specialized cabling if the host device does not support these features. Doing this could be as simple as connecting DTR, RTS, or both, to DSR on the DART 300 end of the cable to provide the needed signals.

Be aware that circumventing hardware flow control in this way makes data overruns a possibility.

	DART 200	**DART 300**
Data rates supported	300 – 19200 bps	300 – 57600 bps
Default data rate	9600 bps	19200 bps
Autobaud	Yes	No
Data bits	7 / 8	8
Parity	None / Even / Odd	None
Stop Bits	1 / 2	1
Flow Control	None, Hardware (RTS/CTS), and Software (XON/XOFF)	Hardware (RTS/CTS) only
FIFO Buffer	Yes	Yes

3.1.2. Control Lines

The DART 300 does not allow configuration of the DCD and DSR signals; a feature supported in the DART 200.

Flow control on the DART 300 is through *hardware only* via RTS/CTS and DTR.

	DART 200	**DART 300**
RTS/CTS	Hardware and software flow control both supported via AT command. Only active in online mode.	Hardware flow control only. RTS *must* be asserted to allow serial communication from the DART 300 to the host. DTR must also be asserted to allow received data state traffic to flow to the host.
DCD	Configurable to track CDPD registration state, link established, or connection established	Asserted while online with an active session. Not configurable.
DSR	Configurable to track CDPD registration state, link established, or connection established	Always on when the modem is powered up. Not configurable.
DTR	Supports **&D0**, and host activated escape via **&D1**, and **&D2**. Hardware debounce is 15µs.	**&D0** ignores DTR transitions[1]. **&D1** enters command state without changing on/off-line condition. **&D2** hangs up and enters command state with auto-answer disabled. Software polling used to determine state. No debounce. DTR must be asserted to allow received data to flow to the host.
RI	Not supported.	Triggered on UDP/TCP mode connection requests. Configurable operation in SLIP/PPP modes.

[1]The DART 300 using the **&D0** setting still requires DTR to be asserted in order to pass received data to the local host.

3.1.3. Packet Service Interfaces

The DART 300 does not include TELNET or PING generation support found in the DART 200. The DART 300 will reply to PINGs but cannot generate them internally.

The DART 300 adds support for PPP connections.

	DART 200	DART 300
SLIP Interface	RFC 1055 SLIP header compression supported.	RFC 1055 SLIP header compression is NOT supported.
PPP Interface	N/A	RFC 1661, RFC 1662, RFC 1332
UDP PAD Interface	RFC 768	PCCA STD-101
TCP PAD Interface	RFC 793	PCCA STD-101
TELNET	RFC 854, RFC 1123	Not available.
PING	Responds if registered. Can generate continuously.	Responds if registered. CANNOT generate PINGs.

3.1.4. Modem Control Interface

	DART 200	DART 300
AT Command Interface[1]	Hayes compatible with CDPD extensions	Hayes compatible with PCCA Wireless Extensions
Object Management Interface	Access to OMI type data via its on board diagnostic functions in AT command mode	SWI Proprietary access in SLIP or PPP service data states only. Not available in AT command state. Remotely accessible using the *Group*Watcher™ application from Sierra Wireless.

[1]A comparative AT Command Reference is found in Section 4.

3.2. Operation

3.2.1. Monitoring Network Connection

Both modems provide mechanisms to monitor the CDPD network connection although the methods to access this information differ.

	DART 200	DART 300
Signal Strength in -dBm	S102	+WPRSSI
Normalized Signal Strength (%)	Not supported.	+WS50
Registration status	S57 (odd value)	+WS56 (=1)
Registration result code[1]	S56	+WS201
Current Channel	S100	+WS200
Current Cell Number	S110	+WS210

[1]Values returned by the respective modems for the registration result code differ in their interpretation. The DART 200 showed the most recent carrier-returned result code. The DART 300 shows a series of registration progress codes that will continually change as the process proceeds. The registration result code is part of this progression, but its value is not maintained in +WS201. To determine the actual result code, this register must be continually monitored during the auto-registration process. Consult the AT command references for specifics.

3.2.2. Channel Acquisition Restrictions

The DART 300 supports only the SPNI matching restriction. This is automatic when there is an entry in the SPNI list. The DART 200 supported SPNI, SPI, and WASI matching restrictions that were controlled using **\Jn**, and a SPNI, SPI, or WASI list. The DART 300 does not support these additional options.

	DART 200	DART 300
SPI – Service Provider ID	Yes (up to 10)	N/A
SPNI – Service Provider Network ID	Yes (up to 10)	Yes (up to 10)
WASI – Wide Area Service ID	Yes (up to 10)	N/A
LSAI – Local Service Area ID	Yes (up to 10)[1]	N/A

[1] Available in CDPD V1.0 only

3.2.3. TCP Characteristics

	DART 200	DART 300
Friends Only mode	Yes (up to 10 IP addresses)	Yes (up to 10 IP addresses)
Auto Answer	Yes[1]	Yes
TCP Keep Alive[2]	Yes, drops connection on receive timeout and generates character on transmit timeout.	Yes, drops connection on receive or transmit timeout. This timer also applies to UDP sessions.

[1]On the DART 200 Auto Answer is off if DTR is off and either &D1 or &D2 is specified. It also requires S0=1 and either the TCP server (*A1) or UDP server (*A2) to be specified.

[2]The behaviour of, and the mechanism for setting, the keep-alive differs between the models. Details follow in Section 3.2.3.1.

3.2.3.1. TCP Keep-Alive

The DART 300 supports only a bi-directional idle timer (**S30**) while the DART 200 can select either or both directions, and will generate a dummy transmission on a transmit timeout in order to hold a session open. Also note that the DART 300 applies the session idle timer to both TCP and UDP sessions, whereas the DART 200 applied keep-alive to TCP only.

The DART 200 uses a timer in register **S86**, which is equivalent to the DART 300's register **S30**. These timers are both in units of minutes and both reset when any data is received or transmitted. The default value in the DART 200 is 120 minutes (**S86=120**), with an allowed range of 1 to 255. There is no zero value because the feature is enabled or disabled using another AT command (***K**). The DART 300 has a narrower timeout range of 0 (disabled) to 20 minutes.

Using the default DART 200 setting of ***K0** (no keep-alives) is equivalent to the default setting on the DART 300 (**S30=0**) with the session timer disabled. The modems will both keep the session open indefinitely.

The DART 300 does not support the unidirectional keep-alive system that the DART 200 can implement with ***K1** (transmit only) and ***K2** (receive only).

For transmit-only cases (***K1**), the DART 200 will forward either a partially assembled packet or, if there is no pending data, a keep-alive character set in **S85**. The receiving end must recognize the single keep-alive character and discard it. The DART 300 does not support sending or receiving these dummy keep-alive character packets.

If the DART 200 is using the receive-only setting (***K2**) then there is a partial equivalent in the DART 300. The DART 300 can close the session if there is no data received within the timeout, but the DART 300 does not recognize dummy keep-alive characters. If the other end of the session sends a dummy keep-alive character, the DART 300 will treat it is valid received data and reset the session timeout timer.

The DART 200 setting of ***K3** (bi-directional keep-alive control) is almost equivalent to the DART 300 setting of **S30=x** where x is the same setting used in the DART 200 register **S86**. Again, the DART 300 cannot process keep-alive character packets from the other end. The timer will reset but the character will not be automatically discarded.

3.2.4. UDP Characteristics

	DART 200	DART 300
UDP Server	Supports multiple concurrent clients.[1] (Receive locking with FIFO queue)	Supports both single and multiple client sessions (by setting +WS217). (Receive locking with FIFO queue and timer). Server is active when listening port +WS212 > 0.
Auto answer	Based on S0=1 and *A2 to configure UDP Server mode.	Based on S0=1 and listening port > 0.
Friends Only mode	Yes (up to 10 IP addresses)	Yes (up to 10 IP addresses)
Dials using "random" source port number	When "Basic" UDP is disabled.	Always

[1]On the DART 200, Basic UDP requires client and server to use the same port number. Auto answer is not supported in Basic UDP. The server must be in online mode (have previously dialled the client) in order to accept data packets from the client.

3.2.4.1. UDP Receive Locking

Both the DART 200 and DART 300 support receive locking to enable the modem to act as a server handling requests from multiple clients on a packet by packet basis. The models follow almost identical behaviour but require differing setups.

A server can receive calls from multiple client devices, or from one client using different source ports for different sessions. However, it can only save one client address and port, the one that was extracted from the last datagram received, for sending any replies. For this reason, if multiple clients are expected, the serving DART modem must use receive locking to delay accepting subsequent datagrams until a response is sent to the source of the prior datagram.

If receive locking is enabled on the DART 200, all datagrams arriving after the first one, regardless of their source address, are held in a First-In-First-Out (FIFO) buffer until a data transmission (reply) occurs, or the time out period expires, releasing the first datagram in the queue.

The only difference with the DART 300 is that datagrams arriving from the same source as the first one are not held unless another datagram from a different source has been received. That means that if there is only one calling client, datagrams are delivered as they are received, without waiting for a reply (or timeout) for each individual packet.

The DART 200 enables the receive lock when **bit 2** of register **S82** is set. The timeout is set in register **S83**. The value of the timeout is measured in **tenths** of a second; the default is 3.0 seconds. The feature is disabled when bit 2 of **S82** is cleared, the default setting.

The feature is enabled on the DART 300 by setting **+WS217=t** where t is the timeout value in **tenths** of a second. Disable the feature by setting the timer to zero (**+WS217=0**), the default setting.

If the receive lock feature is not enabled, each UDP session must be closed (either directly by the local host, or **S30** timeout) before another session can be established. An open session can only communicate with the single IP address **and port** of the first caller. Since each new UDP session from a client will usually have a different port number, even the original caller may not be able to re-connect.

3.3. Additional Control Considerations

3.3.1. Escape Sequence

The escape sequence is used to change from data state to command state. This is a necessary step for the modem to respond to AT commands to close a data session. There are three possible mechanisms to gracefully change to command state:

1. Time Dependent Escape Sequence (TDES) involving the escape character repeated three times with a guard time to prevent false detection in a data stream.
2. Time Independent Escape Sequence (TIES) involving the character stream "AT+++" without use of a guard time. The DART 200 did not support this method. It is available on the DART 300 and is described in detail in the DART 300 User Guide.
3. DTR transition from on to off if it is enabled (&D1 or &D2).

3.3.1.1. Escape from SLIP

The **DART 200** uses an escape sequence of "**+++**" in a timing sequence of EGEGE where E is the escape character (actually the character stored in register **S2** which defaults to the plus sign) and G is a delay of at least the guard time (set in register **S12**). This is *not* Hayes compatible.

In SLIP service, the **DART 300** requires the "**+++**" sequence to be contained in SLIP frame characters (0xC0). Specifically the sequence is **<0xC0>+++<0xC0>**. Timing is irrelevant to the DART 300 in this mode. The escape character (the plus sign) cannot be changed (register **S2** is ignored in SLIP).

Both modems also support use of the DTR signal to escape SLIP mode data state.

3.3.1.2. Escape from UDP / TCP

The **DART 200** escapes from UDP packet service using the same TDES as for SLIP, that is: EGEGE. The **&E** command allows control over whether or not the escape sequence will be recognized and whether or not to forward the escape sequence to the network.

The **DART 300** supports both TDES and TIES. The TDES format uses the Hayes compatible sequence of GEEEG. In this mode the settings of **S2** and **S12** are respected. Note that if the interval between escape characters becomes greater than the guard time, the sequence is broken. Consult the DART 300 User Guide for a full discussion of the required timing.

Enabling recognition of the escape sequences is controlled separately for each type. TDES is disabled by setting the escape character to a value greater than 127 (**S2=128**). TIES is disabled by setting **+WS60=0**. The DART 300 cannot pass the escape sequence to the network.

Both modems also support use of the DTR signal to escape UDP or TCP mode data state.

3.3.2. Packet Assembly / Disassembly (PAD) Features

3.3.2.1. Packet Assembly and Editing

The DART 300 adds the ability to edit the packet data being assembled in the modem. Data is stored in a packet assembly buffer until a forwarding condition is detected. Until that time, the buffered data can be edited using a specified back-space character. The DART 200 did not have this option in UDP or TCP packet service.

The DART 300 uses **+WS73** to define the backspace character for packet buffer editing. The default is 0x08 (BS). The character for AT command line editing is fixed at 0x08 (BS).

Editing of the packet can be disabled in the DART 300 using **+WS72=0**. This is recommended for telemetry applications where the value 0x08 could be valid data. The factory default has the packet edit feature enabled.

3.3.2.2. Packet Assembly Local Echo

Both models are capable of echoing back data as the packet assembler receivers it. This allows a user to see what is being entered before it is sent. For most telemetry applications, this feature should be turned off.

The DART 200 uses the **F** command: F0 to disable echo, F1 to enable it.

The DART 300 uses **+WS62**; 0 to disable echo, 1 to enable it.

3.3.2.3. Packet Forwarding

Both models will forward the packet assembly buffer based on the first of three possible events:

- Primary Forwarding Character (Manual transmission)
- Inter-character timer (Automatic transmission)
- Maximum buffer size (Maximum segment size)

The DART 300 will also forward the packet buffer if the Time Dependent Escape Sequence (TDES) is received.

Manual Transmission

This method uses a user-defined forwarding character as a signal that the buffered packet is complete and can be forwarded to the network.

The DART 200 supports two forwarding characters, defined in registers **S51** and **S52**. The DART 300 supports only one character defined in register **+WS64**.

The use of this forwarding method is enabled on the DART 200 with the command **\M1**. Whether or not to include the forwarding character in the packet is controlled with the **\F** command. Various settings allow none, either, or both characters to be included in the packet.

The DART 300 enables the use of the forwarding character with the setting in **+WS63**; 1 enables it and 0 disables it. The inclusion of the forwarding character in the packet is set with bit 1 of the register: **+WS63=3**. The setting of 3 means that both bits 0 and 1 are set so the feature is enabled and the character will be included.

The defaults are the same for both models with the feature enabled and the character included. The default primary forwarding character is 0x0D (CR).

Automatic Transmission

This method uses a timer to measure a pause in the data stream from the local host. When the time elapses without any data being added to the buffer, the buffer is forwarded to the network.

The DART 200 uses **S50** to set the time in tenths of second; default is 2.0 seconds. The feature is disabled by default and enabled with the **\T1** command.

The DART 300 controls the feature with register **+WS70**. When set to zero (0), the feature is disabled (the default), otherwise the register is the timer in tenths of a second.

Maximum Segment Size

As a safeguard in cases where both of the previous methods are disabled, both models of DART will forward the buffer when a maximum size is reached. The DART 200 only enforces this in TCP sessions. UDP sessions do not have the safeguard. The DART 300 enforces the maximum on both TCP and UDP sessions.

The DART 200 does not allow user control of the maximum buffer size. The size is never greater than 1964 bytes but will usually be less. The Maximum Segment Size reported during the TCP session handshake determines the buffer size. This setting is part of the protocol and is not available to the user.

The DART 300 allows the user to set the buffer size from 1 to 1000 bytes by using **+WS74**. This size is independent of a TCP determined segment size. The TCP stack will ensure that packets assembled from the buffer conform to network requirements.

3.4. Specifications

3.4.1. Modem Features

	DART 200	DART 300
CDPD Version supported	1.0 & 1.1	1.1 only
Maximum packet size (bytes)	1924 (or less as determined by TCP handshake)	User adjustable (**+WS74**) from 1 – 1000.
V.42*bis* compression	Optional	No
Sleep mode (power reduction)	No	Yes (three levels)
Software controlled re-boot	Yes	Yes
Service Provider Mode	Yes	No
Dial Directory	Yes	Yes
Network status over RS232 control signals	Yes	No
View Profile	Yes (**&V** and **&V+**)	No
PING Generation	Yes	No
Onboard Diagnostics	Yes	No
Connection Failure Probable Cause	Yes	No
Personal Identification Number (PIN)	Yes	No
Service Provider Key (SPK)	Yes	No
Friends Only	Yes	Yes

3.4.2. Radio Specifications

	DART 200	DART 300
Transmitter Power	Maximum 3 W	Maximum 600 mW into 50Ω Supports AirBooster 350 RF Amplifier for 3 W operation.
Receiver Sensitivity	Not specified	-108 dBm 5% BLER

3.4.3. Electrical Specification

	DART 200	DART 300
Power Supply	12V, 2.5A	12V, 1A
Peak Transmit Current	2.5 A	850 mA
Peak Receive Current	300 mA	150 mA

4. Comparative AT Command Reference

4.1. Introduction

This chapter compares the AT commands available on the DART 300 with those of the original DART 200. This is not intended as a complete reference to the AT Command behaviour, but instead identifies the differences in behaviour of commands and offers suggested alternatives where the new DART 300 does not support the same functionality as the original DART 200.

There is also a cross reference for commands that exist on the DART 300 but not on the DART 200. These allow users familiar with the DART 200 to better understand command syntax from the DART 300 by finding the roughly equivalent DART 200 commands.

The phrase "**Not supported**" indicates that the command syntax is not directly supported. The functionality may be provided by a different mechanism, which will be described in the table. If no explanatory text is provided, then there is not an equivalent function available.

4.2. AT Command Set

The following tables list the commands grouped by their prefix. **AT** is assumed at the beginning of all commands except where specified. A space following the "**AT**" is optional.

Table 4-1 Basic AT Commands

Command	DART 200	DART 300
+++	Time Dependent Escape Sequence (TDES) Uses a sequence of EGEGE where the guard time between successive characters must meet or exceed the time set in **S12**.	Time Dependent Escape Sequence (TDES) Uses a sequence of GEEEG. That is: a preceding and trailing guard time with the time between successive escape characters less than the guard time.
AT+++	**Not Supported.**	Time Independent Escape Sequence (TIES). Offered only in TCP or UDP mode.
<0xC0> **+++** **<0xC0>**	**Not Supported.**	Escape sequence (SLIP service) **Not preceded by AT**. There are no guard times associated with this escape sequence.
A/	Repeat Last Command **Not preceded by AT**. Re-executes the last AT command string entered (buffered).	Repeat Last Command Same behaviour.
A	Answer – Manual Behaviour and result codes discussed in the DART 200 reference.	Answer – Manual Similar behaviour in practice but details are different from the DART 200. Result codes are also interpreted differently. Consult the respective product references for details.

Table 4-1: Basic AT Commands (continued)

Command	DART 200	DART 300
D [options]	Dial Takes dial modifier **T** or **P** for TCP and UDP sessions respectively. Takes dotted-decimal IP and optional port number delimited using a slash (*/*); e.g. **DP192.0.2.1/2100** – dials a UDP session to port 2100. If the port number is omitted a value of **23** is used. Uses dial modifier **S** for Quick Dial from a list of stored addresses; e.g. **DTS3** – dials a TCP connection to the third address in the list. A TCP connection attempt is repeated every 10 seconds for a total of 60 seconds. Will auto-register on dial is **\R2** is set. Result codes vary – see DART 200 reference.	Dial Assumes the protocol from the setting of **+WS45**. Takes dotted-decimal IP and port number delimited with a period (**.**); e.g. **D192.0.2.1.2100** – dials a session to port 2100 using the protocol set in +WS45. If either parameter is omitted, the last dialled value is used. Allows a Quick Dial using an index to the Friends List; e.g. **D3** – dials the third entry. TCP connection attempts are issued up to three times at 0, 10s, and 30s within the duration of the timer set in **S7**. UDP behaviour is the same as DART 200. Will auto-register if the modem is not currently registered on the CDPD network. Result codes vary – see DART 300 reference.
E[n]	Echo (Command State) Controls echoing of characters from the host (DTE) back to the host when the modem is in command state.	Echo (Command State) Same behaviour.
F[n]	Echo (Data State) Controls local echo of data while on-line. Note enabled is set with **F0** and disabled is set with **F1**.	*PAD Local On-Line Echo* **Not supported.** When using TCP or UDP PAD modes, a +WS register is used to control local echo. **F0** = **+WS62=1** (enabled) **F1** = **+WS62=0** (disabled)
H[n]	Hook Control Supports four options: **H0** – transmit buffers, then close session. **H1** – no action taken; return OK. **H2** – close session, discarding buffers. **H3** – discarding buffers, close session, and deregister.	Hook Control Supports two options only: **H0** – close session and remain registered is equivalent to the DART 200 **H2**, and **H1** – close session and deregister is equivalent to DART 200 **H3**. Buffered packet data is discarded in both cases.
I[n]	Identification/Checksum Command Parameters and meanings vary; consult DART 200 reference.	Identification/Checksum Command Parameters and meanings vary; consult DART 300 reference.
O	On-line Causes the modem to go from command state to data state for an existing session.	On-line Same behaviour.

Table 4-1: Basic AT Commands (continued)

Command	DART 200	DART 300
Q[n]	Quiet – Result Code Display Option Suppress result codes to the DTE.	Quiet – Result Code Display Option Same behaviour.
S[n]=[x]	S-Register Write Sets the contents of the specified S-register (n) to the new value (x).	S-Register Write Same behaviour.
S[n]?	S-Register Read The contents of the specified S-register (n) are returned to the host (DTE) as ASCII decimal digits.	S-Register Read Same behaviour.
V[n]	Verbose – Result Code Form Specifies whether the modem displays the result codes in numeric format or as words (verbose).	Verbose – Result Code Form Same behaviour.
X[n]	Result Code Select Selects extended result codes (0 to 10) or only the set from 0 to 4.	Result Code Select The DART 300 modem takes no action. This command is acknowledged with OK and ignored. All result codes are always enabled.
Z	Reset to Stored Profile The modem loads the profile from permanent storage into the active memory.	Reset to Stored Profile Same behaviour.

Table 4-2: AT [&] Commands

Command	DART 200	DART 300
&C[n]	Data Carrier Detect Control Selects meaning of DCD control signal. Consult DART 200 reference for details of options.	Data Carrier Detect Control The DART 300 modem takes no action. This is acknowledged with OK and ignored. DCD always indicates session status; on = open, off = closed. This is equivalent to the DART 200's default option **&C1**.
&D[n]	Data Terminal Ready Options Controls action taken on an on-to-off transition of DTR. See the DART 200 User Guide for details. Default is **&D0**	Data Terminal Ready Options Same behaviour. (See Section 3.1.1 above if hardware flow control is not provided by your local host device.) Default is **&D2**

Table 4-2: AT [&] Commands (continued)

Command	DART 200	DART 300
&E[n]	Escape Code Recognition Controls handling of the escape character sequence: enabled or disabled, and whether or not to forward the sequence to the network.	*Escape Code Recognition* TDES is disabled by setting the escape character in **S2** to a value >127. TIES is disabled using **+WS60=0**. The DART 300 always filters the escape sequence from the data stream. The DART 200 equivalents are: DART 200 / TDES / TIES **&E0** / **S2=128** / **+WS60=0** **&E1** / -none- / -none- **&E2** / **S2=43** / **+WS60=1**
&F	Factory Settings Restore Reloads the factory-stored default configurations. Consult the DART 200 reference for exact values.	Factory Settings Restore Same behaviour. Consult the DART 300 reference for exact values.
&I	*Ring Indicator* Not supported.	Ring Indicator Enables or disables the use of the Ring Indicator (RI) signal when in SLIP or PPP packet service.
&L	Line Speed and Format Set the DTE/DCE line speed and format. This requires **&W** to preserve the setting across resets. **&L1** reactivates autobaud.	*Line Speed and Format* **Not supported.** The line speed can be set using **+IPR** but the format (data bits, parity, and stop bits) cannot be changed from 8, N, 1. Autobaud is not supported.
&S	Data Set Ready Option Controls behaviour of the DRS control signal. See the DART 200 User Guide for details.	*Data Set Ready Option* **Not supported.** The DART 300 always asserts DSR when the modem is powered.
&V	View Active Profile Displays the active configuration of modem settings and registers S0 to S99.	*View Active Profile* **Not supported.** The DART 300 has no single mechanism to display the full configuration set.
&V+	View Radio Resource Status Displays radio status from registers **S100** to **S126**.	*View Radio Resource Status* **Not supported.**
&W	Write the Active Profile Saves the configuration in active memory to non-volatile memory for restoration on next reset or power cycle.	Write the Active Profile Same behaviour.
&Z	Save Dial Directory Entry Allows the user to save commonly used IP addresses in a non-volatile memory.	*Save Dial Directory Entry* **Not supported.** The DART 300 uses the Friends List as the dial directory. This list is saved to non-volatile memory with each list entry update.

The Backslash (\) command set is only available on the DART 200. The DART 300 uses alternative commands or registers where equivalents exist.

Table 4-3: AT [\] Commands

Command	DART 200	DART 300 Equivalent
\F	Character Data Forwarding Operation The DART 200 supports two forwarding characters, indicated in **S51** and **S52**. The **\F** command determines whether any of the data forwarding characters specified in S51 and S52 are included in the packet transmitted to the remote data service.	PAD Forwarding Character Feature Mask The DART 300 supports only one forwarding character, indicated in **+WS64**. **+WS63** sets the handling of the primary forwarding character. **\F0** = **+WS63=1** **\F1-3** = **+WS63=3**
\J	Restrict Channel Selection Allows channel acquisition to be restricted based on the carrier settings for SPNI, SPI, and/or WASI. See the DART 200 User Guide for details..	Service Provider Network ID Table Write. Restricts channel acquisition based on carrier's SPNI. **\J0** = **+WPSPNI=<enter>** **\J1** = not supported **\J2** = **+WPSPNI=<list>** **\J3-7** = not supported
\M	Manual Transmit Control Enables or disables packet forwarding based on a forwarding character. If enabled then **\F** controls additional behaviour.	PAD Forwarding Character Feature Mask **\M0** = **+WS63=0** **\M1** = **+WS63=1** or **2** (see **\F** above)
\N	Side Preference Allows setting of channel side preference including setting of home only.	Channel Side A/B Preference Does not directly support "home only" (**\N0**); use **+WPSPNI** to restrict to home provider in conjunction with side preference. **\N1** = **+WS174=3** (A only) **\N2** = **+WS174=4** (B only) **\N3** = **+WS174=1** (A Preferred) **\N4** = **+WS174=2** (B Preferred)
\O	Operation Mode Selects Telnet or PAD (TCP/UPD) mode. SLIP mode is selected with ***S**.	PAD – Packet Service The DART 300 does not support Telnet mode. The other modes (PADs and SLIP/PPP) are selected with **+WS45**. **\O0** = **+WS45=0** or **1** (UDP or TCP) **\O1** = not supported **+WS45=3** or **4** (SLIP or PPP)
\P	PIN Requirement / Setting Allows the user to require, not require, or change the modem's PIN.	*PIN Requirement / Setting* **Not supported.**
\Q	Flow Control Settings Selects flow control options: none, hardware (RTS/CTS), software (XON/XOFF).	*Flow Control Settings* **Not supported.** The DART 300 only supports hardware flow control. (See Section 3.1.1 above if hardware flow control is not provided by your local host device.)

Table 4-3: AT [\] Commands (continued)

Command	DART 200	DART 300 Equivalent
\R	Registration Control Controls the modem's CDPD network registration. Auto-registration is controlled by a combination of **\R4** and **S13=0**. **S13** controls the registration timeout. See the DART 200 User Guide for details.	*Registration Control* The DART 300 controls registration with a combination of **+WS173** and commands **+WPREG** and **+WPDEREG**. Register **+WS198** controls the registration process timeout. **\R0** = **+WPDEREG** **\R1** = **+WPREG** **\R2** = not supported (**H1** can be used to deregister when session is closed.) **\R3** = not supported **\R4** = **+WS173=1** **\R5** = **+WS173=0**
\S	Subscriber Identity Displays the modem's NEI (IP Address), used to select the NEI to be used for network registration, and also used to display the SPNI list. It supports both point-to-point (normal) and multicast (if being used) IP Addresses. The CDPD Service Provider provides the IP addresses. See the DART 200 User Guide for details.	*Subscriber Identity* Setting the NEI is managed with register **+WS197** and the command **+WPNEI**. Selecting the NEI to register is controlled with **+WS197** (manual registration) and **+WS176** (auto-registration). SPNI list display is available using **+WPSPNI?**. For details on Broadcast and Multicast, consult the DART 300 User Guide.
\T	Automatic Transmit Control Enables the inter-character timer (**S50**) for data forwarding.	PAD Inter-Character Timer +WS70 sets the inter-character timeout. A setting of zero disables it. **\T0** = **+WS70=0** **\T1** = **+WS70=t** (where t is the setting used in **S50** of the DART 200).

The Asterisk (*) command set is only available on the DART 200. The DART 300 uses alternative commands or registers where equivalent functionality exists.

Table 4-4: AT [*] Commands

Command	DART 200	DART 300 Equivalent
***A**	Server Type Specifies the type of server to be used: TCP or UDP.	*Server Type* The DART 300 selects packet service for both client and server sessions. ***A0** = **S0=0+WS212=0** (no server) ***A1** = **+WS45=1** (TCP) ***A2** = **+WS45=0** (UDP)
***B**	Broadcast Reception Control Enables or disables the reception of IP broadcast packets.	Consult the DART 300 User Guide for details on Broadcast application.

Table 4-4: AT [*] Commands (continued)

Command	DART 200	DART 300 Equivalent
***C**	Compress SLIP Header Controls SLIP mode header compression (V-J compression) between the local host and the DART 200 modem.	*Compress SLIP Header* **Not supported.**
***E**	Enable / Disable Network Operations If PINs are required for network access, this command enables and disables access to the network.	*Enable / Disable Network Operations* **Not supported.**
***G**	Multicast Address Selection Specifies whether the multicast NEI or the modem's active point-to-point NEI is passed to the local host as the multicast data packet's destination address.	Consult the DART 300 User Guide for details on multicast operation.
***K**	Keep-Alive for TCP Sessions Allows modems using TCP to time out, or keep-alive a TCP session with no current activity. See the DART 200 User Guide for details.	*Keep-Alive for TCP Sessions* The DART 300 supports a timeout for gracefully closing both UDP and TCP sessions based on no traffic in either direction. There is no internal keep-alive "dummy" packet support. See Section 3.2.3.1 above for more detail. ***K0** = **S30=0** (no timeout) ***K1-2** = not supported (unidirectional) ***K3** = **S30=t** (t = time equivalent to DART 200 register **S85**) Where the DART 200 would send and receive keep-alive dummy packets for *K3, the DART 300 requires no such packets and will *not* discard dummy keep-alive data.
***L**	Listening Port Specifies the port number that the servers (TCP or UDP) listen on for connection requests or incoming data packets.	Listening Port The DART 300 uses a register for this. ***L<p>= +WS212=<p>**
***M**	MAS IP address for SLIP Sets the IP Address of the local host (MAS) connected to the DART's serial port.	*MAS IP address for SLIP* **Not supported.** WirelessExpert will configure a Dial-up Networking SLIP connection with the modem's NEI as the source IP address.
***P**	PING Issues ICMP Echo Requests to a Remote Host and waits for a response.	*PING* **Not supported.** PINGs must be originated from the local host using a SLIP or PPP connection.
***R**	Automatic SLIP Mode Controls whether or not the modem will power-up to a SLIP data state rather than the AT command state.	*Automatic SLIP Mode* **Not supported.**

Table 4-4: AT [*] Commands (continued)

Command	DART 200	DART 300 Equivalent
***S**	SLIP Mode Initiate Initiates a SLIP session on the serial port. It is also used to return to SLIP mode following an escape.	SLIP Mode Initiate SLIP sessions are started or re-entered with the **ATO** (On-line) command.
***T**	Telnet Keep-Alive Allows the modem to time out, or keep-alive a telnet session with no current activity. Similar to the function of ***K**.	*Telnet Keep-Alive* **Not supported.**
***U**	Unblock Modem PIN Access Used to unblock the modem if the PIN is forgotten or is entered incorrectly 3 times.	*Unblock Modem PIN Access* **Not supported.**

The Carat (^) command set is only available on the DART 200. The DART 300 uses alternative commands or registers where equivalents exist.

Table 4-5: AT [^] Commands

Command	DART 200	DART 300 Equivalent
^A	Address Set Loads an IP Address into one of the 10 slots in the DART 200's NEI list.	Active NEI Write The DART 300 uses an index register **(+WS197**) to access a table of four NEIs. **^A<ip>/<n>** **= +WS197=<n>+WPNEI=<ip>** Erasing an NEI is accomplished by writing an IP address of 0.0.0.0
^C	Clear Blocked Status Clears the blocked status of the PIN.	*Clear Blocked Status* **Not supported.**
^F	Force PIN Usage Specifies whether or not modem users require PINs.	*Force PIN Usage* **Not supported.**
^G	GMID – Multicast Group ID Attaches a GMID to the user-defined multicast NEI.	Consult the DART 300 User Guide for details on multicast operation.
^H	Set SPI Loads an SPI into one of the 10 slots in the DART's SPI table	*Set SPI* **Not supported.**
^I	Set SPNI Loads a SPNI into one of the 10 slots in the DART's SPNI table	Service Provider Network ID Table Write The DART 300 does not index the SPNI list. The entire list is replaced with each write. **^H<spni>/<n>** **= +WPSPNI=[spni[,spni2[,…]]]>**

Table 4-5: AT [^] Commands (continued)

Command	DART 200	DART 300 Equivalent
^L	LASI and WASI Set Sets the LASI/WASI value into one of the 10 slots in the DART's table.	*LASI and WASI Set* **Not supported.**
^P	Personalization Mode This command must be issued before any other Service Provider commands can be executed.	*Personalization Mode* **Not supported.**
^S	SLIP Address Set Sets the SLIP IP Address of the Modem. This internal address is a private address between the modem and the terminal connected to the serial port and is unknown to the network.	*SLIP Address Set* **Not supported.**

The Minus (-) command set is only available on the DART 200. The DART 300 uses alternative commands or registers where equivalent functions exist.

Table 4-6: AT [-] Commands

Command	DART 200	DART 300 Equivalent
-L	Lock Specific Channel Override normal Radio Resource Management functions and lock onto a specific channel.	Set Modem Channel Channel locking and scanning is controlled with **+WPCHAN**. **-L<n>** = **+WPCHAN=<n>** **-L-** = **+WPCHAN=0** (unlock)
-R	Reboot Restarts the DART 200.	Reset The DART 300 is reset with **+WVRESET**.
-V	View Radio Source Management Data Displays the current value of pertinent Radio Resource Management Data. See the DART 200 User Guide for details.	*View Radio Source Management Data* **Not supported.**
-Z	Display Current Authentication Credentials Shows the current values for the ASN (sequential) and ARN (random) authentication numbers.	*Display Current Authentication Credentials* **Not supported.**

4.3. DART 300 Specific Commands

The Plus (+) command set is only available on the new DART 300. The DART 200 uses alternative commands or registers where equivalents exist. This section is provided as a cross reference to the equivalent commands in the older DART 200.

Table 4-7: AT [+] Commands

Command	DART 200	DART 300
+IPR	*I/O Port Rate (DTE speed)* Supported via the **&L** command.	I/O Port Rate (DTE speed) Sets the communication speed between the host (DTE) and the DART 300 modem.
+WCID	Display the System ID (SPNI). Register **S108** contains the current SPNI.	Display the System ID (SPNI). Returns the Service Provider Network Identifier (SPNI).
+WPCHAN	Lock Specific Channel Supported via the **-L** command.	Set Modem Channel Sets channel scanning, or locks to a specific channel.
+WPCURNEI	*Subscriber Identity* Supported via the **\S?** query. The NEI marked with an asterisk is the current one.	Current NEI Returns the NEI (in dotted IP format) pointed to by **+WS176** (Auto-register NEI Index). This should be the current, or last registered, NEI.
+WPDEREG	Registration Control Supported using **\R0**. Also supported indirectly via the **H3** command.	De-register The NEI indexed by **+WS197** (Active NEI Index) is de-registered from the network.
+WPEID	Equipment Identifier (EID) Supported via the **I0** Identification command. Also shown by the **&V** command.	Equipment Identifier (EID) Returns the modem's unique CDPD equipment identification code in dotted-decimal and Hexadecimal notation.
+WPNEI=<ip>	*Personalization* Supported via the **\Sn** command to set the index (equivalent to **+WS197**) then the personalization mode command **^A<ip>/<port>** to set the address.	Active NEI Write Writes the specified IP address to the table entry indexed by **+WS197** (Active NEI Index).
+WPNEI?	*Subscriber Identity* Supported via the **\S?** query. The NEI marked with an asterisk is the current one.	Active NEI Read Returns the active NEI, in dotted IP format, from the NEI table as determined by the index in **+WS197** (Active NEI Index).
+WPNEILIST	*Subscriber Identity* Supported via the **\S?** query. The NEI marked with an asterisk is the current one.	NEI List Displays the four-entry NEI table, with the type and status of each.
+WPREG	Registration Control Supported using **\R1**.	Register (Manual) Registers the NEI entry indexed by **+WS197** (Active NEI Index) with the network.

Table 4-7: AT [+] Commands (continued)

Command	DART 200	DART 300
+WPRSSI	*Mean RSSI* The mean RSSI is available in register **S102**.	RSSI and Channel State Returns the current Receive Signal Strength Indication (RSSI), channel state, registration status, and channel number.
+WPSPNI= [n[,n[,...n]]]	*Restrict Channel Selection* Uses a combination of the personalization mode command **^I** to set the SPNI value(s) and **\J2** to enable SPNI matching.	Service Provider Network ID Table Write. Sets up to 10 SPNI values in decimal, separated by commas.
+WPSPNI?	*Subscriber Identity* Supported via the **\S?** query. The SPNI list is displayed in addition to the NEI table.	Service Provider Network ID Table Read Returns the SPNI table.
+WS<n>=[x]	*WS-register Write* **Not supported.** The DART 200 uses only S registers.	WS-register Write Sets the contents of the specified +WS-register (n) to the new value (x).
+WS<n>?	*WS-register Read* **Not supported.** The DART 200 uses only S registers.	WS-register Read The contents of the specified +WS-register (n) are returned to the host (DTE) as ASCII decimal digits.
+WVCALLERIP	Caller IP Supported via the **S53** register. This also includes the port number.	Caller IP Reports the IP address of the currently connected remote terminal. The port number is not included.
+WVFRIEND=	*Friends Only* Uses the dial directory entered via **&Z**. Checking is enabled with **S82=1**.	Active Friend Write This writes the specified IP address and optional port to the table entry indexed by **+WS213** (Active Friend List Index).
+WVFRIEND?	*Active Friend Read* The dial directory used for friend list matching is displayed using **&Z?**.	Active Friend Read Returns the IP address and port, in dotted IP format, of the Friend List table entry as determined by the index in **+WS213** (Active Friend List Index).
+WVFRIENDLIST	*Active Friend Read* The dial directory used for friend list matching is displayed using **&Z?**.	Friend List Displays the current ten-entry Friend List table.
+WVRESET	Reboot Supported using the **–R** command.	Soft Modem Reset Resets the modem to power-up condition.

4.4. Status Registers

This section deals with the registers available on the two modems from the aspect of function only. Consult the specific model references for detailed descriptions of specific value ranges and meanings.

DART 200 registers used for Service Provider Mode are generally not shown as these are unsupported in the DART 300 and do not have equivalents. If an equivalent does exist, the register is shown in the table below.

4.4.1. S-Registers

Table 4-8: S-Registers

Register	DART 200	DART 300
0	Auto-answer	Auto-answer
1	Telnet <CR><LF>	**Not Supported.**
2	Escape Character	Escape Character
3	Carriage Return Character	**Not Supported.** Fixed at 13 (0x0D)
4	Line Feed Character	**Not Supported.** Fixed at 10 (0x0A)
5	Back Space Character	**Not Supported.** Fixed at 8 (0x08) Note that the PAD editing feature has a backspace character in **+WS73.**
6	Delete Character	**Not Supported.**
7	ATA command connection establishment time-out (default 60).	TCP Handshake Timeout (default 30). Also consult **+WS198** Registration Wait Time
12	Escape Guard Time (default 50)	Escape Guard Time (default 0)
13	Registration Timeout	**Not supported.** Registration timout is in register **+WS198**.
14	Bit Mapped Command Options (Read Only)	Bit Mapped Command Options (Read Only)
21	Bit Mapped Command Options (Read Only)	Bit Mapped Command Options (Read Only)
22	Bit Mapped Command Options (Read Only)	**Not supported.**
23	Bit Mapped Command Options (Read Only)	**Not supported.**
30	Channel Congested timer (Service Provider Mode) The DART 300 does not have an equivalent.	PAD Inactivity Timeout The DART 200 equivalent is **S86**
31	Spiral decrement for intra-area cell channel search (Service Provider Mode) The DART 300 does not have an equivalent.	Logic Sleep Enable The DART 200 does not have an equivalent.
50	PAD Data forwarding idle time-out.	**Not supported.** PAD Inter-character Timer is in register **+WS70**.
51	PAD Primary Forwarding Character 1	**Not supported.** PAD Primary Forwarding Character is in register **+WS64**.

Table 4-8: S-Registers (continued)

Register	DART 200	DART 300
52	PAD Primary Forwarding Character 2	**Not supported.** The DART 300 has only one Primary Forwarding Character (**+WS64**).
53	IP Address and port number of current TCP/UDP session partner.	**Not supported.** The IP address can be obtained with **+WVCALLERIP**. The port number is not available.
57	State information (bitmapped)	**Not supported.** The various elements reported by the DART 200 can be queried on the DART 300 using the command equivalents: **b0,1** = **+WS56?** (registration status) **b2,3** = **not supported** (Use DCD) **b4,5** = **+WS173?** (auto-registration) **b6** = **not supported** (auto-SLIP) **b7** = **+WPRSSI** (coverage/ chan acquisition.)
56	Last registration result code received from the network.	**Not supported.** Registration progress is available from register **+WS201**. The values have different meanings from those of the DART 200.
58	PAD status (bitmapped)	**Not supported.** The various elements reported by the DART 200 can be queried on the DART 300 using the command equivalents: **\T** = **+WS70?** (PAD frwd timer) **\M** = **+WS63?** (Pri. frwd. char) **\Q** = -none- (Always H/W flow) **\F** = **+WS63?** (Pri. frwd. char) **\O** = -none- (no Telnet support)
62	Connection Failure	**Not supported.**
63	Connection Failure Probable Cause	**Not supported.**
70	PING Wait Timeout	**Not supported.**
71	PING Data Length	**Not supported.**
77	Telnet Escape Character	**Not supported.**
78	Telnet Starting Terminal Type	**Not supported.**
79	Graceful TCP Shutdown (bitmapped)	**Not supported.** The DART 300 always attempts graceful shutdown of TCP sessions.
82	Friends Only and UDP Controls (bitmapped) (Service Provider Mode)	*Friends Only and UDP Controls* The features are available with various commands as follows: **b0** = **+WVFRIEND=** (friends only) **b1** = **not supported** **b2** = **+WS217** (UDP receive lock) **b3** = **not supported** **b4** = **not supported** Client sessions only support traffic with the destination server.

Table 4-8: S-Registers (continued)

Register	DART 200	DART 300
83	UDP Receive Lock Timer (Service Provider Mode)	UDP Receive Lock Timer Supported as **+WS217**.
85	TCP Keep-Alive Character	**Not supported.**
86	Telnet/TCP Keep Alive Timeout	**Not supported.** The DART 300 uses **S30** for timing out UDP/TCP sessions.
100	RF channel currently being reported (may not be acquired)	**Not supported.** The current channel can be read from **+WS200**.
101	CDPD Available Flag	**Not supported.** The normalized signal strength is available from **+WS50**. If it is 0, there is no CDPD signal available. The modem may be scanning for another CDPD channel.
102	Mean RSSI in dBm.	**Not supported.** The RSSI can be obtained with **+WPRSSI**.
103	Current Transmit Power Level	**Not supported.**
104	MDBS Power Product	**Not supported.**
106	Current SER in %	**Not supported.**
107	Current LASI/WASI	**Not supported.**
108	Current SPNI	**Not supported.** The SPNI is available using **+WCID**
109	Current CSI	**Not supported.**
110	Current Cell Number	**Not supported.** The Cell Number is available from **+WS210**.
111	Current Color Code	**Not supported.**
112	Current Transmit BLER in %	**Not supported.**
113	Current Symbols in Error (SIE)	**Not supported.**
114	Current SPI	**Not supported.**
120-125	Various Statistics	**Not supported.**
126	Registration Protocol States	**Not supported.** These states are included in the Registration Status reported in **+WS201**.

4.4.2. WS-Registers in the DART 300

This section provides a cross reference from the DART 300's +WS register set to the equivalent DART 200 commands or registers.

Table 4-9: WS-Registers

Register	DART 200 Equivalent	DART 300
45	***A** for server side and **T** or **P** dial modifier for client side.	PAD – Packet Service
50	**Not supported.**	Normalized Signal Strength
56	**S57** bit 0	Network Registration Status
60	**Not supported.**	Time Independent Escape Sequence (TIES)
62	Command **F** (Echo Data State).	PAD Local On-Line Echo
63	**\M** for bit 0 equivalence (enabling) **\F** for bit 1 equivalence (inclusion)	PAD Forwarding Character Feature Mask
64	**S51** or **S52**; the DART 300 only supports one forwarding character.	PAD Primary Forwarding Character
70	**S50** to set the timer. **\T** to enable or disable use.	PAD Inter-Character Timer
72	**Not supported.**	PAD Input Buffer Editing Enable
73	**Not supported.**	PAD Input Buffer Backspace Character
74	**Not supported.** Fixed at 1924.	PAD Maximum Packet Length
173	Registration Control Supported via **\R4** for auto-registration and **\R2** for "manual" registration (automatic with dial). Settings can be queried at **S57**.	Registration Mode
174	Supported with **\N**.	Channel Side A/B Preference
175	**Not supported.**	CDPD Sleep Idle Time
176	Supported using the **\S** command.	Auto-register NEI Index
179	**Not supported.**	Registration Wait Status
197	Supported using the **\S** command.	Active NEI Index
198	Supported in register **S13**.	Registration Wait Time
200	Supported in register **S100**.	Current Channel Number
201	Result codes are reported in **S56**. Registration progress is reported in **S126**.	Registration Progress and Result Codes
209	**Not supported.**	Radio Temperature
210	Supported in register **S110**.	Cell Number
212	Supported by command ***L**.	Listening Port
213	**Not supported.**	Friend List Index
217	Register **S83** contains the timer. Bit 2 of **S82** enables the feature.	UDP Server Receive Lock

4.5. Result Codes

This table provides a numerical list of the result codes possible on the DART 300. DART 200 codes 9 and 10 are related to PIN use, which is not supported on the DART 300.

Table 4-10: DART 300 Result Codes

Code	Verbose	DART 300 Meaning
0	OK	Command executed without error.
1	CONNECT	Client Sessions – In SLIP and UDP this means a session is open and the modem is in data state, but does not necessarily verify that the modem is registered on the network. In TCP it indicates the session is open and the destination is logically connected. Server Sessions – The modem has opened the session and gone into data state. The CONNECT message will be appended by the IP address of the caller.
2	RING	A connection to an accepted IP is requested.
3	NO CARRIER	The modem did not have an active CDPD connection, or a TCP session was closed by the other terminal.
4	ERROR	Illegal command. Error in command line. Command line exceeds buffer size. NVRAM failure. **S63** in the DART 200 contained an extended reason code, not supported in the DART 300.
5	CONNECT	Connected with an active session. The modem transitions from command state to data state.
6	PAD ERROR	An error has occurred in the packet service stack. The modem must be reset. **The DART 200 uses this to mean NO DIALTONE – the modem was not registered when the connection was attempted.**
8	NO ANSWER	TCP service failed to complete the connection handshake. **The DART 200 uses this to mean NO ANSWER – the remote modem was out of coverage or not registered (TCP only).**

The DART 200 also supported code 7 to mean BUSY. This indicated that the remote modem was busy, an invalid port was specified, or the server function was not active (TCP only).

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